

**What is claimed is:**

- 1           1.    An assembly of beam splitters, comprising:
  - 2           a roof-prism, comprising a first emitting/receiving
  - 3           surface, a roof surface and a first reflecting
  - 4           surface, when a beam of first wavelength enters
  - 5           the roof-prism through the first
  - 6           emitting/receiving surface, the beam of first
  - 7           wavelength is sequentially reflected by the
  - 8           first reflecting surface, the roof surface and
  - 9           the first emitting/receiving surface and leaves
  - 10          the roof-prism from the first reflecting
  - 11          surface;
  - 12          a triangle prism, comprising a second
  - 13          emitting/receiving surface, a second reflecting
  - 14          surface and a total internal reflecting
  - 15          surface, wherein the beam of first wavelength
  - 16          from the roof-prism enters the triangle prism
  - 17          through the total internal reflecting surface,
  - 18          and is sequentially reflected by the second
  - 19          reflecting surface and the total internal
  - 20          reflecting surface and leaves the triangle
  - 21          prism from the second emitting/receiving
  - 22          surface; and
  - 23          a complementary prism, which is adjacent to the
  - 24          second reflecting surface of the triangle
  - 25          prism, and comprises a third emitting/receiving
  - 26          surface and a fourth emitting/receiving
  - 27          surface;

28            wherein a beam of second wavelength enters the  
29            complementary prism through the third  
30            emitting/receiving surface and passes the  
31            second reflecting surface to enter the triangle  
32            prism, and then the beam of second wavelength  
33            is emitted from the second emitting/receiving  
34            surface of the triangle prism by reflecting by  
35            the total internal reflecting surface, so that  
36            the optical axis of the beam of second  
37            wavelength and the optical axis of the beam of  
38            first wavelength are coaxial; and

39            wherein a beam of third wavelength enters the  
40            complementary prism through the fourth  
41            emitting/receiving surface and passes the  
42            second reflecting surface to enter the triangle  
43            prism, and then the beam of third wavelength  
44            passes the first reflecting surface to enter  
45            the roof-prism and is sequentially reflected by  
46            the first emitting/receiving surface, the roof  
47            surface and the first reflecting surface so as  
48            to emit from the first emitting/receiving  
49            surface of the roof-prism, so that the optical  
50            axis of the beam of third wavelength and the  
51            optical axis of the beam of first wavelength  
52            are coaxial.

1            2. The assembly of beam splitters as claimed in  
2            claim 1, wherein the beam of first wavelength is  
3            reflected by the second reflecting surface, and the beam

4 of second wavelength and the beam of third wavelength  
5 travel through the second reflecting surface

1 3. The assembly of beam splitters as claimed in  
2 claim 1, wherein the second emitting/receiving surface  
3 and the total internal reflecting surface form a  $48^\circ$   
4 included angle, the second emitting/receiving surface and  
5 the second reflecting surface form a  $108^\circ$  included angle,  
6 the second reflecting surface and the total internal  
7 reflecting surface form a  $24^\circ$  included angle, the third  
8 emitting/receiving surface and the fourth  
9 emitting/receiving surface form a  $132^\circ$  included angle,  
10 the fourth emitting/receiving surface form a  $132^\circ$   
11 included angle, and the third emitting/receiving surface  
12 and the second reflecting surface form a  $24^\circ$  included  
13 angle.

1 4. The assembly of beam splitters as claimed in  
2 claim 1, wherein the beam of second wavelength enters the  
3 second emitting/receiving surface of the triangle prism  
4 and is reflected to the complementary prism by the total  
5 internal reflecting surface, so as to emit from the third  
6 emitting/receiving surface of the complementary prism;

7 and the beam of third wavelength passes the first  
8 emitting/receiving surface and is sequentially reflected  
9 by the first reflecting surface, the roof surface and the  
10 first emitting/receiving surface, and then the beam of  
11 third wavelength travels through the triangle prism to  
12 enter the complementary prism, so that the beam of third

13 wavelength is emitted from the fourth emitting/receiving  
14 surface.

1       5.   An assembly of beam, comprising:  
2       a    triangle    prism    comprising    a    second  
3       emitting/receiving surface, a second reflecting  
4       surface and a total internal reflecting  
5       surface, wherein a beam of first wavelength  
6       enters the triangle prism through the second  
7       emitting/receiving surface and is sequentially  
8       reflected by the total internal reflecting  
9       surface and the second reflecting surface, so  
10      as to emit from the total internal reflecting  
11      surface;  
12      a roof-prism comprising a first emitting/receiving  
13      surface, a roof surface and a first reflecting  
14      surface, wherein the beam of first wavelength  
15      from the triangle prism enters the roof-prism  
16      through the first reflecting surface, and is  
17      sequentially reflected by the first  
18      emitting/receiving surface, the roof surface  
19      and the first reflecting surface, so as to emit  
20      from the first emitting/receiving surface; and  
21      a complementary prism, which is adjacent to the  
22      second reflecting, and comprises a third  
23      emitting/receiving surface and a fourth  
24      emitting/receiving surface;  
25      wherein a beam of second wavelength enters the  
26      complementary prism through the third  
27      emitting/receiving surface and passes the

28           second reflecting surface to enter the triangle  
29           prism, the beam of second wavelength is  
30           reflected by the total internal reflecting  
31           surface and emitted from the second  
32           emitting/receiving surface of the triangle  
33           prism, so that the optical axis of the beam of  
34           second wave-length and the optical axis of the  
35           beam of first wavelength are coaxial; and  
36        wherein a beam of third wavelength enters the  
37           complementary prism through the fourth  
38           emitting/receiving surface and passes the  
39           second reflecting surface to enter the triangle  
40           prism, the beam of third wavelength passes the  
41           first reflecting surface to enter the roof-  
42           prism and is sequentially reflected by the  
43           first emitting/receiving surface, the roof  
44           surface and the total internal reflecting  
45           surface and emitted from the first  
46           emitting/receiving surface of roof-prism, so  
47           that the optical axis of the beam of third  
48           wavelength and the optical axis of the beam of  
49           first wavelength are coaxial.

1           6. The assembly of beam splitters as claimed in  
2        claim 5, wherein the beam of first wavelength is  
3        reflected by the second reflecting surface, and the beam  
4        of second wavelength and the beam of third wavelength  
5        passes through the second reflecting surface.

1           7. The assembly of beam splitters as claimed in  
2        claim 5, wherein the second emitting/receiving surface

3 and the total internal reflecting surface form a  $48^\circ$   
4 included angle, the second emitting/receiving surface and  
5 the second reflecting surface form a  $108^\circ$  included angle,  
6 the second reflecting surface and the total internal  
7 reflecting surface form a  $24^\circ$  included angle, the third  
8 emitting/receiving surface and the fourth  
9 emitting/receiving surface form a  $132^\circ$  included angle,  
10 the fourth emitting/receiving surface and the second  
11 emitting/receiving surface form a  $132^\circ$  included angle,  
12 and the third emitting/receiving surface and the second  
13 reflecting surface form a  $24^\circ$  included angle.

1 8. The assembly of beam splitters as claimed in  
2 claim 5, wherein the beam of second wavelength enters the  
3 triangle prism through the second emitting/receiving  
4 surface and is reflected to the complementary prism by  
5 the total internal reflecting surface, so as to emit from  
6 the third emitting/receiving surface of the complementary  
7 prism; and

8 the beam of third wavelength enters the roof-prism  
9 through the first emitting/receiving surface and is  
10 sequentially reflected by the first reflecting surface,  
11 the roof surface and the first emitting/receiving  
12 surface, and then the beam of third wavelength travels  
13 through the triangle prism to enter the complementary  
14 prism, so that the beam of third wavelength is emitted  
15 from the fourth emitting/receiving surface.

1 9. A rangefinder for measuring the distance  
2 between user and a target, comprising:

3       a viewing/emitting optical system, comprising  
4       a first object lens, receiving an image produced  
5       from the target;  
6       an assembly of beam splitters as claimed in claim 1,  
7       wherein the image following the path of the  
8       beam of first wavelength is incident on the  
9       first emitting/receiving surface and emits from  
10      the second emitting/receiving surface;  
11      an ocular lens, which receives the image from the  
12      assembly of beam splitters and let user see the  
13      target;  
14      an emitter, emitting an invisible beam toward the  
15      fourth emitting/receiving surface of the  
16      assembly of beam splitters, wherein the  
17      invisible beam following the path of the beam  
18      of third wavelength is emitted from the first  
19      emitting/receiving surface, and passes the  
20      first object lens to travel toward the target;  
21      and  
22      a display, emitting a narrow-band beam toward the  
23      third emitting/receiving surface of the  
24      assembly of beam splitters and shows the  
25      distance, wherein the narrow-band beam  
26      following the path of the beam of second  
27      wavelength is emitted from the second  
28      emitting/receiving surface, and shown for user  
29      by the ocular lens; and  
30      a receiving optical system, comprising  
31      a second object lens, receiving the invisible beam  
32      reflected from the target; and

33           a detector, receiving the invisible beam passing  
34           through the second object lens.

1           10. The rangefinder as claimed in claim 9, said  
2 emitter is a laser diode.

1           11. The rangefinder as claimed in claim 9, said  
2 display is a liquid crystal display, a LED display or an  
3 OLED display.

1           12. A rangefinder for measuring the distance  
2 between user and a target, comprising:  
3           an emitting optical system, comprising  
4           an emitter, emitting an invisible beam; and  
5           a second object lens, guiding the invisible beam to  
6           the target; and  
7           a viewing/receiving optical system, comprising  
8           a first object lens, receiving an image produced  
9           from the target and the invisible light  
10          reflected from the target;  
11          an assembly of beam splitters as claimed in claim 1,  
12          wherein the image following the path of the  
13          beam of first wavelength is incident on the  
14          first emitting/receiving surface and emits from  
15          the second emitting/receiving surface, and the  
16          invisible beam following the path of the beam  
17          of third wavelength is incident on the first  
18          emitting/receiving surface and emits from the  
19          fourth emitting/receiving surface;



20           an ocular lens, which receives the image from the  
21           assembly of beam splitters and let user see the  
22           target;  
23           a detector, receiving the invisible beam from the  
24           fourth emitting/receiving surface; and  
25           a display, emitting a narrow-band beam toward the  
26           third emitting/receiving surface of the  
27           assembly of beam splitters and shows the  
28           distance, wherein the narrow-band beam  
29           following the path of the beam of second  
30           wavelength is emitted from the second  
31           emitting/receiving surface, and shown for user  
32           by the ocular lens.

1           13. The rangefinder as claimed in claim 12, said  
2           emitter is a laser diode.

1           14. The rangefinder as claimed in claim 12, said  
2           display is a liquid crystal display, a LED display, or an  
3           OLED display.

1           15. A rangefinder for measuring the distance  
2           between user and a target, comprising:  
3           a viewing/emitting optical system, comprising  
4           a first object lens, receiving an image produced  
5           from the target;  
6           an assembly of beam splitters as claimed in claim 5,  
7           wherein the image flowing the path of the beam  
8           of first wavelength is incident on the second  
9           emitting/receiving surface and emitted from the  
10           first emitting/receiving surface;

11 an ocular lens, which receives the image from the  
12 assembly of beam splitters and let user see the  
13 target;  
14 an emitter, emitting an invisible beam toward the  
15 third emitting/receiving surface of the  
16 assembly of beam splitters, wherein the  
17 invisible beam following the path of the beam  
18 of second wavelength is emitted from the second  
19 emitting/receiving surface, and passes the  
20 first object lens to travel toward the target;  
21 and  
22 a display, emitting a narrow-band beam toward the  
23 fourth emitting/receiving surface of the  
24 assembly of beam splitters and shows the  
25 distance, wherein the narrow-band beam  
26 following the path of the beam of third  
27 wavelength is emitted from the first  
28 emitting/receiving surface, and shown for user  
29 by the ocular lens; and  
30 a receiving optical system, comprising  
31 a second object lens, receiving the invisible beam  
32 reflected from the target; and  
33 a detector, receiving the invisible beam passing  
34 through the second object lens.

1 16. The rangefinder as claimed in claim15, said  
2 emitter is a laser diode.

1 17. The rangefinder as claimed in claim 15, said  
2 display is a liquid crystal display, a LED display, or an  
3 OLED display.

1        18. A rangefinder for measuring the distance  
2 between user and a target, comprising:

3        an emitting optical system, comprising  
4        an emitter, emitting an invisible beam; and  
5        a second object lens, guiding the invisible beam to  
6        the target; and

7        a viewing/receiving optical system, comprising  
8        a first object lens, receiving an image produced  
9        from the target and the invisible light  
10       reflected from the target;

11       an assembly of beam splitters as claimed in claim 5,  
12       wherein the image following the path of the  
13       beam of first wavelength is incident on the  
14       second emitting/receiving surface and emits  
15       from the first emitting/receiving surface, and  
16       the invisible beam following the path of the  
17       beam of second wavelength is incident on the  
18       second emitting/receiving surface and emits  
19       from the third emitting/receiving surface;

20       an ocular lens, which receives the image from the  
21       assembly of beam splitters and let user see the  
22       target;

23       a detector, receiving the invisible beam from the  
24       third emitting/receiving surface; and

25       a display, emitting a narrow-band beam toward the  
26       fourth emitting/receiving surface of the  
27       assembly of beam splitters and shows the  
28       distance, wherein the narrow-band beam  
29       following the path of the beam of third

30                   wavelength    is    emitted    from    the    first  
31                   emitting/receiving surface, and shown for user  
32                   by the ocular lens.

1           19. The rangefinder as claimed in claim 18, said  
2   emitter is a laser diode.

1           20. The rangefinder as claimed in claim 18, said  
2   display is a liquid crystal display, a LED display, or an  
3   OLED display.